WHAT IS CLAIMED IS:

1. A method for analyzing a single patient sample to simultaneously determine levels of four biological markers indicative of thyroid disorders, said method comprising:

(a) incubating said sample with a mixture of particles in a first suspension, said mixture of particles comprised of groups (i) through (iv):

(i) particles coated with anti-thyroid stimulating hormone,

(ii) particles coated with anti-triiodothyronine,

(iii) particles coated with anti-thyroxine, and

(iv) particles coated with a mixture of a diluting agent and a member selected from the group consisting of thyroid peroxidase and anti-human IgG,

each group distinguishable from each other group by flow cytometry;

(b) recovering said particles from said first suspension, and incubating said recovered particles with a mixture of labeled binding members in a second suspension, said mixture of labeled binding members comprising:

(1) labeled anti-thyroid stimulating hormone,

(2) a labeled analog composition toward which anti-triiodothyronine and anti-thyroxine have immunological binding affinity, but in which said immunological binding affinity is less than that of anti-triiodothyronine toward triiodothyronine and of anti-thyroxine toward thyroxine, and

(3) either labeled anti-human IgG when particles of group (iv) are coated with thyroid peroxidase, or labeled thyroid peroxidase when particles of group (v) are coated with anti-human IgG;

said diluting agent being inert toward said biological markers and said labeled binding members; and

(c) recovering said particles from said second suspension and detecting the amount of label bound to said particles thus recovered while correlating by flow cytometry the amount of label thus detected to the group to which said label is bound, thereby simultaneously obtaining

values individually representative of the levels of thyroid stimulating hormone, triiodothyronine, thyroxine, and anti-thyroid peroxidase.

2. A method in accordance with claim **1** in which said particles of group (iv) are coated with a mixture of said diluting agent and anti-human IgG and said labeled binding member (3) is labeled thyroid peroxidase.

3. A method in accordance with claim **1** in which:

said particles of group (iv) are coated with a mixture of said diluting agent and thyroid peroxidase,

said labeled binding member (3) is labeled anti-human IgG,

said mixture of particles further comprises group (v), which consists of particles coated with a mixture of a diluting agent and thyroglobulin, and

step (c) comprises simultaneously obtaining values individually representative of the levels of thyroid stimulating hormone, triiodothyronine, thyroxine, anti-thyroid peroxidase, and anti-thyroglobulin.

4. A method in accordance with claim **1** in which said labeled analog composition of (b)(2) is a single species having immunological binding affinity to both anti-triiodothyronine and anti-thyroxine.

5. A method in accordance with claim **4** in which said single species is a member selected from the group consisting of labeled N-*tert*-butyloxycarbonyl-3,5-diiodo-L-thyronine, labeled N-acetyl-3-iodo-L-tyrosine, labeled N-*tert*-butyloxycarbonyl-3',3,5-triiodo-L-thyronine, labeled N-*tert*-butyloxycarbonyl-3,5-diiodo-L-tyrosine, labeled N-acetylphenylalanyl-3,5-diiodo-L-tyrosine, labeled N-acetyl-3,5-dibromo-L-tyrosine, and labeled N-acetyl-3,5-diiodo-L-tyrosine.

6. A method in accordance with claim **4** in which said single species is labeled N-acetyl-3-iodo-L-tyrosine.

7. A method in accordance with claim **1** in which said labeled binding members are binding members labeled with fluorescent labels.

8. A method in accordance with claim **7** in which said fluorescent labels are B-phycoerythrin.

9. A method in accordance with claim **1** in which said labeled analog composition of (b)(2) is a combination of two distinct species, one having immunological binding affinity to anti-triiodothyronine and another having immunological binding affinity to anti-thyroxine.

10. A method in accordance with claim **1** in which said labeled binding members are labeled with a common label.

11. A method in accordance with claim **1** in which said particles comprise magnetically responsive material and recovery of said particles in steps (b) and (c) is achieved by subjecting said first and second suspensions, respectively, to a magnetic field to cause said particles to adhere to a reaction vessel wall.

12. A method in accordance with claim **1** in which said particles incorporate dyes, each of groups (i) through (iv) incorporating a distinct dye that is distinguishable by flow cytometry over the dyes of each other group, and step (c) comprises distinguishing such dyes by flow cytometry while detecting the amount of label bound to said particles.

13. A method in accordance with claim **1** in which said diluting agent is a member selected from the group consisting of bovine serum albumin, hydrolyzed porcine gelatin, keyhole limpet hemocyanin, amine-derivatized dextran, and polyacrylic acid.

14. A method in accordance with claim **1** in which said diluting agent is bovine serum albumin.

15. A method in accordance with claim **1** in which said second suspension of step (b) comprises said recovered particles and said labeled binding members suspended in a buffer solution in which bovine gamma globulin is a solute in a saline solution at approximately physiological pH.

16. A method in accordance with claim **1** in which said second suspension of step (b) comprises said recovered particles and said labeled binding members suspended in a buffer solution in which polyethylene glycol is a solute at a concentration of from about 0.5% to about 4.0% by weight.

17. A method in accordance with claim **1** in which said second suspension of step (b) comprises said recovered particles and said labeled binding members suspended in a buffer solution in which polyethylene glycol is a solute at a concentration of from about 2.0% to about 3.0% by weight.

18. A method in accordance with claim **1** in which said particles of group (iv) have a thyroid peroxidase coating density of from about 0.3ng/cm^2 to about 1.0μg/cm^2.

19. A method in accordance with claim **1** in which said particles of group (iv) have a thyroid peroxidase coating density of from about 0.5ng/cm^2 to about 50ng/cm^2.

20. A method in accordance with claim **1** in which group (i) is comprised of two subgroups differing from each other by particle size such that one subgroup provides a substantially greater sensitivity and is thereby useful for measuring lower concentrations of TSH, than the other.

21. A method in accordance with claim **1** in which group (i) is comprised of two subgroups differing from each other by coating density of anti-thyroid stimulating hormone such that one subgroup provides a substantially greater sensitivity and is thereby useful for measuring lower concentrations of TSH, than the other.

22. A method in accordance with claim **1** in which group (i) is comprised of two subgroups differing from each other by both particle size and coating density of anti-thyroid stimulating hormone such that one subgroup provides a substantially greater sensitivity and is thereby useful for measuring lower concentrations of TSH, than the other.

✓ 23. A method for analyzing a single patient sample to simultaneously determine levels of thyroid stimulating hormone and anti-thyroxine, said method comprising:

(a) incubating said sample with a mixture of particles in a first suspension, said mixture of particles comprised of groups (i) and (ii):

(i) particles coated with anti-thyroid stimulating hormone, and

(ii) particles coated with anti-thyroxine,

the groups distinguishable from each other by flow cytometry;

(b) recovering said particles from said first suspension, and incubating said recovered particles with a mixture of labeled binding members in a second suspension, said mixture of labeled binding members comprising:

(1) labeled anti-thyroid stimulating hormone, and

(2) a labeled analog toward which anti-thyroxine has immunological binding affinity, but in which said immunological binding affinity is less than that of anti-thyroxine toward thyroxine; and

(c) recovering said particles from said second suspension and detecting the amount of label bound to said particles thus recovered while correlating by flow cytometry the amount of label thus detected to the group to which said label is bound, thereby simultaneously obtaining values individually representative of the levels of thyroid stimulating hormone and thyroxine.

24. A method in accordance with claim **23** in which said second suspension of step (b) comprises said recovered particles and said labeled binding member suspended in a buffer solution in which polyethylene glycol is a solute at a concentration of from about 0.5% to about 4.0% by weight.

25. A method in accordance with claim **23** in which said second suspension of step (b) comprises said recovered particles and said labeled binding member suspended in a buffer solution in which polyethylene glycol is a solute at a concentration of from about 2.0% to about 3.0% by weight.